

WE CLAIM:

1. A method for performing photolithography, comprising:
 - providing a spatial light modulator with data representing a portion of an image to be photolithographically transferred onto a substrate, the spatial light modulator comprising light modulation elements;
 - transferring the portion of the image from a first set of the light modulation elements onto an area of the substrate; and
 - transferring the portion of the image from a second set of the light modulation elements onto the area of the substrate.
2. The method according to claim 1, further comprising:
 - dividing the image into image sections; and
 - dividing the image sections into image subsections, the portion of the image transferred to the substrate corresponding to at least one of the image subsections.
3. The method according to claim 2, further comprising:
 - dividing the light modulation elements into light modulation banks, each light modulation bank being capable of transferring one of the image subsections.

1 4. The method according to claim 1, wherein said transferring the portion of the
2 image from the first set of light modulation elements further comprises:

3 loading data representing the portion of the image into the first set of light
4 modulation elements; and

5 altering the state of ones of the first set of light modulation elements in
6 response to the data.

1
1 5. The method according to claim 4, wherein the first set of light modulation
2 elements includes a defective light modulation element, and wherein said transferring the
3 portion of the image from the second set of light modulation elements further comprises:
4 placing one of the light modulation elements in the second set of light
5 modulation elements corresponding to the defective light modulation element in the first set
6 of light modulation elements in the correct state as a function of the data loaded into the
7 second set of light modulation elements.

1
1 6. The method according to claim 1, further comprising:
2 transferring the portion of the image from at least a third set of the light
3 modulation elements onto the area of the substrate.

1 7. A method for performing photolithography, comprising:
2 positioning a substrate having a photosensitive surface in relation to a spatial
3 light modulator comprising light modulation elements;
4 exposing an area of the photosensitive surface with a portion of an image in
5 response to respective states of a first set of the light modulation elements;
6 altering the positional relationship between the substrate and the spatial light
7 modulator; and
8 exposing the area of the photosensitive surface with the portion of the image
9 in response to respective states of a second set of the light modulation elements.

1
1 8. The method according to claim 7, further comprising:
2 achieving grayscale in the image on the area of the photosensitive surface
3 using both said exposings.

1
1 9. The method according to claim 7, further comprising:
2 integrating the total energy from each said exposing on the area of the
3 photosensitive surface.

1
1 10. The method according to claim 7, further comprising:
2 exposing the area of the photosensitive surface with the portion of the image
3 in response to respective states of a third set of the light modulation elements.

1 11. A photolithography apparatus, comprising:
2 light modulation elements, a first set of said light modulation elements
3 operable to photolithographically transfer a portion of an image onto an area of a substrate,
4 and a second set of said light modulation elements operable to photolithographically transfer
5 the portion of the image onto the area of the substrate; and
6 memory elements in communication with respective ones of said light
7 modulation elements, said memory elements being configured to store data representing the
8 portion of the image.

1
1 12. The photolithography apparatus according to claim 11, wherein the image is
2 divided into image sections and the image sections are divided into image subsections, and
3 the portion of the image corresponds to one of the image subsections.

1
1 13. The photolithography apparatus according to claim 12, wherein said light
2 modulation elements are divided into sections, each light modulation element section being
3 capable of transferring one of the image subsections, the first set of light modulation elements
4 being one of the light modulation element sections and the second set of light modulation
5 elements being another one of the light modulation element sections.

1
1 14. The photolithography apparatus according to claim 13, wherein said light
2 modulation elements are arranged in an array having rows and columns.

1 15. The photolithography apparatus according to claim 14, wherein the first and
2 second sets of light modulation elements include one or more respective ones of the rows.

1 16. The photolithography apparatus according to claim 14, wherein the first and
2 second sets of light modulation elements include one or more respective ones of the columns.

1 17. The photolithography apparatus according to claim 11, wherein said light
2 modulation elements comprise liquid crystal material.

1 18. The photolithography apparatus according to claim 17, wherein said light
2 modulation elements further comprise:

3 a common electrode configured to receive a common electrode signal for said
4 light modulation elements; and

5 pixel electrodes configured to receive the data stored in said respective
6 memory elements.

1 19. The photolithography apparatus according to claim 11, wherein said light
2 modulation elements comprise micromirrors.

1 20. The photolithography apparatus according to claim 11, wherein the first set of
2 light modulation elements includes a defective light modulation element, and wherein one of
3 the light modulation elements in the second set of light modulation elements corresponding to
4 the defective light modulation element in the first set of light modulation elements is not
5 defective.

1 21. The photolithography apparatus according to claim 11, wherein a third set of
2 light modulation elements is operable to photolithographically transfer the portion of the
3 image onto the area of the substrate.

1
1 22. A photolithography system for transferring an image to a substrate having a
2 photosensitive surface, said system comprising:
3 a spatial light modulator including light modulation elements, a first set of the
4 light modulation elements operable to transfer a portion of an image onto an area of said
5 substrate and a second set of the light modulation elements operable to transfer the portion of
6 the image onto the area of said substrate; and
7 a stage operable to move one of said spatial light modulator and the substrate
8 relative to the other.

1
1 23. The photolithography system according to claim 22, further comprising:
2 a laser optically coupled to said spatial light modulator to illuminate said
3 spatial light modulator with light.

1
1 24. The photolithography system according to claim 23, wherein the first and
2 second sets of light modulation elements minimize spatial variations in the intensity of the
3 light transferred to the substrate.

1
1 25. The photolithography system according to claim 22, wherein the light
2 modulation elements further include respective memory elements configured to store data
3 representing the respective portion of the image, the light modulation elements being
4 alterable in response to the data stored in the respective memory elements.